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PTO 00-4015

CY=JP DATE=19851212 KIND=A  
PN=60-251498

INSTALLMENT PAYMENT PROCESSING METHOD OF ELECTRONIC CASH REGISTER  
[Den'shi shiki kyasshurejisuta no bun'katsubarai shori houshiki]

Nobuhiko Iri

UNITED STATES PATENT AND TRADEMARK OFFICE  
Washington, D.C. September 2000

Translated by: FLS, Inc.

PUBLICATION COUNTRY	(19):	JP
DOCUMENT NUMBER	(11):	600251498
DOCUMENT KIND	(12):	A [PUBLISHED UNEXAMINED APPLICATION]
PUBLICATION DATE	(43):	19851212
APPLICATION NUMBER	(21):	590108827
APPLICATION DATE	(22):	19840529
INTERNATIONAL CLASSIFICATION	(51):	G 07 G 1/12
INVENTOR	(72):	IRI, NOBUHIKO
APPLICANT	(71):	FUJI ELECTRIC CO., LTD.
TITLE	(54):	INSTALLMENT PAYMENT PROCESSING METHOD OF ELECTRONIC CASH REGISTER
FOREIGN TITLE	(54A):	DEN'SHI SHIKI KYASSHUREJISUTA NO BUN'KATSUBARAI SHORI HOUSHIKI

## 1. Title of the Invention

Installment Payment Processing Method of Electronic Cash Register

## 2. Claims

1) Installment payment processing method of electronic cash register characterized by: being equipped with a sale registration means, which calculates the sales amount per sale by means of a registration key input and which at the same time calculates and stores the total of said sales, a depositing means, which calculates and stores the total of the deposits by means of a cash key input, and an installment balancing means for storing the fact that one portion of the sale amount will be balanced in installments by an installment payment key input; and being arranged in a manner such that when the installment payment key is entered, the sale registration means performs only the calculation of the sales amount per sale based on the content stored in the installment balancing means and such that the content stored inside the installment balancing means is erased only by the operation of the depositing means that is based on the cash key input.

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\*Numbers in the margin indicate pagination of the foreign text.

### 3. Detailed Explanation of the Invention

#### [Industrial Field to Which the Invention Belongs]

The present invention pertains to electronic cash registers, specifically to cash registers utilized in restaurants and hotels and to electronic cash registers of a type capable of deferred payment balancing and installment balancing.

#### [Prior Art and Problems Thereof]

Electronic cash registers have become widely popular in recent years and they are indispensable in mass sales stores, etc. As their usages expand, it is desired for them to have various functions that suit the usages. On the other hand, from the perspective of account balancing in retail sales, business customs are changing as can be seen in the prevalence of credit cards, and it has become necessary for cash registers to be flexible so that they can cope with new modes of payment. For instance, the above described restaurants and hotels have their own customers in their business locations, and it is important to attempt to provide conveniences to these customers. In other words, it is necessary to promote the patronage of these customers by creating the convenience of deferred payments or installment payments of a part of a charge, not to mention payment with credit cards.

As electronic cash registers that can handle such demands, there have conventionally been those capable of deferred payment

balancing. It is arranged so that the cost at the time of a sale /570 is stored in a credit account storage area, and when there is a payment or deposit from the customer, the stored credit account of the customer is called out and balanced. In other words, this type of cash register is equipped with a verification key, which is for calling out the credit account. For instance, by entering the verification number of a customer to perform balancing and pressing this verification key, the amount of the credit account stored for each customer can be called out.

However, in the case of an installment in which a portion of the expense is paid or balanced at the time of or after the sale, the function to be equipped by the cash register becomes very complex. One reason for this is instances in which, for example, multiple customers dine together all at once or in which multiple regular customers are at one table in a restaurant. Although the credit account is stored for each table, it is not always clear which credit account belong to which specific customer. Under these conditions, balancing of each person's share or of partial amounts is carried out as required for each customer afterwards. In cases of such deferred payments and installments, problems may occur at a later date unless it is clear which sales items have been balanced and when. However, if all sale times, items, and prices are stored in a cash register to prepare for balancing at a later date, then naturally a large storage capacity becomes

necessary, and not only does the register become expensive but also the operation of the register becomes complex accordingly, which makes the occurrence of key operation errors likely. This defeats the purpose of making the register complex. Moreover, the program for the operation of the register also becomes complicated, the program storage area becomes large, and the number of operational steps is increased, as well. Therefore, it would take a long time for a small cash register to process data.

Due to such a background, although cash registers equipped with a deferred payment processing function have been conventionally known, registers having an installment payment processing function have not been actualized, except for cases in which a host computer is provided as a backup, and installment balancing had to be processed separately from the cash register.

[Purpose of the Invention]

Based on the above-described current situation, the purpose of the present invention is to develop installment payment processing methods of electronic cash registers in which the key operations are simple, in which there are few operation errors, and in which the number of operational steps for programs can be small.

[Essential Points of the Invention]

According to the present invention, this purpose is achieved while hardly complicating the register at all by means of the

following: Adding an installment balancing means, which stores the fact that a portion of the sale goes to installment by means of installment payment key input, to an electronic cash register equipped with at the least a sale registration means, which calculates the sales amount per sale by means of a registration key input and which at the same time calculates and stores the total of said sale, and a depositing means, which calculates and stores the total of the deposit by means of a cash key input; and structuring the relationships between said means in a manner such that when the installment payment key is entered, the sale registration means performs only the calculation of the sales amount per sale based on the content stored in the installment balancing means and such that the content stored inside the installment balancing means is erased only by the operation of the depositing means that is based on the cash key input.

In a cash register structured in this manner based on the method of the present invention, when balancing an installment, the verification key is pressed after keying in said verification number of the customer or table. Next, when the installment payment key is pressed, an installment balancing program is activated immediately, the amount of the credit account is called out from the credit account storage area and is displayed or printed, and at the same time, the sale registering program is put in an installment balancing mode. Then, installment



balancing can be performed by activating the sale registration means and depositing means by means of exactly the same key operation as that of regular sales, and therefore, key operation errors of the register rarely occur. At this time, the sale registration means only calculates the sales necessary for the balancing and does not add the balance to the sale total. Moreover, since the depositing means clears the installment balancing mode for the first time after normally adding the balance to the deposit total, there is no fear of totaling errors or of misuse for another payment. /571

[Working Example of the Invention]

In the following, a working example of the present invention will be explained in detail by referring to drawings.

Figure 1 is a functional schematic diagram showing the principles of the method of the present invention. As shown in the figure, a cash register of the method of the present invention contains a sale registration means [1], depositing means [2], and installment balancing means [3], shown in the figures as functional blocks, and these means are electronic functioning means incorporated in the microcomputer shown in Fig. 3, for instance. Toward the top of the figure, there is a keyboard [30] having keys as the means for activating these means is shown, and it contains ten keys [K10] for inputting the sale quantity and sale unit price, a category key group as the

registration keys [KR] for activating the sale registration means, a cash key [KC] for activating the inputting means, an installment payment key [KD] for activating the installment balancing means, a deferred payment key [KP] for storing the credit accounts, and a verification key [KID] for identifying the customers. Moreover, toward the bottom of the figure, a RAM [15] for the storage device inside the above-described microcomputer [10] and a display/printing means [40] are shown. Inside the RAM [15], there are a registration area [RA] as a temporary storage area for sales, etc., a total area [TA] for storing the sums of sales, etc., and a credit area [PA] for storing credit amounts, etc. On the other hand, the display/printing means [40] contains a number display device [DISP] for displaying the sales amount, etc. of each sale and a printer [PRT] for printing and issuing receipts. The arrow of Fig. 1 indicated with a solid line indicates the route and direction of a command between the structural components, while the arrow indicated with dotted lines indicates the route and direction of the data of the quantity, amount, etc. The operations of the components inside this functional schematic diagram are described in detail later, and the relationships among the means, [1], [2], and [3], that are the main components of the present invention are symbolically indicated by means of the flags [F] stored inside the installment balancing means in this figure. In other words, when the

installment balancing means [3] is activated by means of the installment payment key [KD], said means assigns "1" to the flag [F], and thus generates an instruction to the sale registration means [1] to go into an installment balancing mode. The depositing means [2] clears the installment balancing mode by returning said flag to 0 at a point at which the depositing process is finished.

Figure 2 shows in a summarized manner the appearance of a cash register in which the method of the present invention is utilized. Said register is hardly different from a regular register in terms of its appearance except that just one installment payment key [KD] is provided on the keyboard [30]. As shown in the figure, in the cash register [50], a main unit case [52] is mounted and fixated on a cash receipt box [51] equipped with a drawer [51a] for inserting cash into and removing cash out of, and said case [52] is provided with an internally stored electronic device, the above-described display devices, such as a keyboard [30] equipped with a control key [31] and a number display device [DISP], and a printer [PRT]. Moreover, an external connecting means [53] for adding a printer, etc. as necessary is provided on the outside surface.

Figure 3 is an example that shows electronic devices for implementing the method of the present invention from the hardware perspective. The main means for implementing the

present invention are stored in the microcomputer device [10] shown on the left side of the chain line in the figure. As shown in the figure, inside the microcomputer [10], an 8085 series CPU [13], a ROM [14], and the above-described RAM [15], for example, are connected to an address bus [11] and a data bus [12], and both buses are connected to an input/output port [17] and an output port [18] via an address decoder [16], etc. The input/output port [17] is connected with a controller chip [21] that is commonly provided to the keyboard [30] and number display device [DISP] in this implementation and that is shown on the right side of the input/output port [17], and it receives key input signals from the keyboard [30] via an input filter [21a], transfers them to the computer [10], and at the same time, displays the data in digits specified by a digit driver [25] via a decoder [23] in response to an instruction from the computer [10] via a segment driver [24] by using prescribed characters. On the other hand, the output port [18] contains a serial interface and allows the printer [PRT] to print the specified data via a printer driver [26] by providing an instruction and the data to another controller chip [22] located to the right.

Figure 4 shows an example of the assignments between the storage areas inside the above-described RAM [15] for implementing the method of the present invention, and it is shown as three divisions, which are the registration area [RA], the

credit area [PA], and the total area [TA]. The registration area [RA] contains an area for the sales amount [S] per sale calculated inside the CPU [10] based on the quantity and unit price input from the ten keys [K10] of the keyboard [30], an area /572 for installment balancing amounts [D], and an area for storing the logical value of the above-described flag [F]. The credit account area [PA] consists of multiple areas for storing the credit amounts, [P1] - [Pm], to be paid later individually with respect to each customer or each of the table numbers, [1] - [m]. From these areas, writing and reading of the amount data is carried out by using the customer numbers as the verification address numbers, [1] - [m]. The inside of the last total area is divided roughly into a category total portion and a grand total portion, and the former includes n areas that correspond to the category numbers, [1] - [n]. In the case of a restaurant, these categories are types such as dishes, drinks, soups, desserts, etc., and are set appropriately by the user of the register. The sales, [B1T] - [BnT], of such categories are individually stored in the above described n areas. In the grand total part, at the least areas for the sales grand total [ST], the credit grand total [PT], and the deposit grand total [CT] are provided.

In Fig. 5, an example of the key arrangement inside the keyboard [30] is shown, and it includes the commonly known ten keys [K10] for inputting numerical data, etc., a function key

group [KF], and a category key group [KR] provided for the above-described categories. The function key group [KF] includes keys for activating the means for the method of the present invention. More keys than shown in the figure can be provided in actuality, but for simplification, only a verification key [KID], a deferred payment key [KP], an installment payment key [KD], and a cash key [KC] are shown. The category key group [KR] contains several tens of keys as necessary, and they are utilized for rough classification of the sales items and as the activation key of the sale registration means [1] as described later.

The structure of a cash register in which the method of present invention was implemented was briefly explained from the hardware perspective. Next, the method of the present invention will be explained from the software perspective by referring to Fig. 6, which shows the key operation procedure, and the flow chart of Fig. 7, which shows the operation of the means activated by said key operations.

The key operation procedure shown in Fig. 6 (a) is the simplest procedure that does not involve any deferred payment or installment. According to the registration procedure [RP], when the registration key [KR] is pressed after inputting the sale quantity and unit price by operating the ten keys [K10] as shown in (e) of the same figure, the sale registration means of Fig. 7 (r) becomes activated. Since the registration key [KR] is a

category key shown in Fig. 5, one of the  $n$  categories described earlier, such as the registration key [KRj] of the  $j$ th category, is operated. By this, the CPU [13] calculates the sale amount [A] based on the sale quantity and unit price input from the ten keys [K10]. In the ten key operation example of Fig. 6 (e), the quantity is 3 and the unit price is 560. Therefore, the sale amount [A] is 1680 yen. The sale registration means adds this sale amount to the sales proceeds [S], which is inside the registration area [RA] of the RAM [15], in the step [R1] as indicated in Fig. 7 (r). In the next judging step [R2], the step moves to [R3] since the flag [F] at this stage is 0. The sale amount [A] is added to the total sales [BjT] of the  $j$ th category inside the total area [TA], and moreover, the sale amount [A] is added to the total sales [ST] in Step [R4]. In the last step, [R6], the sale amount [A] is printed by the printer [PRT]. The registration key operation procedure [RP] is repeated the number of times necessary for one sale, the registration is completed, and it shifts to the next deposit key operation procedure [CP]. As shown in Fig. 6 (a), the depositing means [2] of Fig. 7 (c) becomes activated when the cash key [KC] is pressed after inputting the amount [B] received from the customer by using the ten keys [K10]. In the Step [C1] of the depositing means [2], the sales proceeds [S] corresponding to the sale that was added and stored in the registration area [RA] at the registration

stage is added to the deposit grand total [CT] in the total area [TA]. In the next judging step [C2], since the flag [F] is still 0, Steps [C3] and [C4] are skipped, and it shifts to Step [C5]. In this Step [C5], the change [CH], which is the difference between the sale amount [S] and the money received [B], is displayed in the number display device [DISP] and, at the same time, is printed by the printer [PRT]. The receipt printed by the printer [PRT] is handed over to the customer together with the change and one sale is thus completed, but the depositing means continues to clear the sale amount [S] inside the registration area in Step [C6] and prepares for the next sale. In the above manner, the key operation procedures, [RP] - [CP], of Fig. 6 (a) are completely normal procedures, so to speak, and can be said to be the basics of cash register operations. In the method of the present invention, consideration is given to the elimination of operational errors by changing this key operation procedure as little as possible as described later. The key operation procedure shown in Fig. 6 (b) corresponds to a /573 deferred payment sale. Prior to the registration procedure [RP], the verification key [KID] is pressed after inputting the verification number of the customer with a ten key operation, such as that indicated in (f) of the same figure, and the credit balance of the customer is called out. The verification process shown in Fig. 7 (i) is activated by means of this verification



key, and in the first Step [11], the credit amount [P1] of the customer of the verification number [i] (No. 100 in the example of Fig. 6 (f)) is transferred from the credit area [PA] to the registration area [RA] as the sales proceeds [S]. In the next Step [12] the credit amount [Pi] inside the credit area [PA] is cleared once, and furthermore, in Step [13] the sale amount [S], that is to say the credit amount [Pi], is subtracted from the credit grand total [PT] inside the total area. This sale amount [S] = [Pi] is then printed out by means of a printer [PRT] in the next Step [14], and the verification procedure is completed.

The next key operation in Fig. 6 (b) is a registration procedure [RP], and this is repeated multiple times in accordance with the sales content. The sale amount is printed for each item by means of the printer [PRT], and at the same time, the sales proceeds [S] are summed. By pressing the deferred payment key [KP] after finishing the registration, the deferred payment process procedure of Fig. 7 (p) is activated. In the first Step [P1] of this deferred payment procedure, the sale amount [S] that is the result of the above summation is added to the credit grand total [PT] of the total area [TA]. As is clear from the above explanation, this sale amount [S] is an updated credit amount obtained by adding the sale amount of the sale this time to the pre-existing credit amount [Pi]. In the next Step [P2], the sale amount [S], which is the updated credit amount, is transferred to

the credit area [PA] as a credit amount [Pi] and is stored in the area of the verification number [i]. Next, in Step [P3] the sale amount [S] is displayed and, at the same time, is printed out with the printer [PRT]. Furthermore, the sale amount [S] inside the registration area [RA] is cleared in Step [P4], and the deferred payment sales process is completed. At this time, since two receipts are printed out at the same time in Step [P3], one of them is handed over to the customer, and the other one is kept in the store for later balancing.

The key operation procedure of Fig. 6 (c) is for the depositing process of a deferred payment. If the customer wants to pay off the whole credit amount, the credit amount [Pi] of the verification number [i] is called out as the sale amount [S] into the registration area [RA] by pressing the verification key after inputting the verification number [i] of the customer using the ten keys in the same manner as above. Then, by pressing the deposit key [KC] after inputting the deposit amount [B] received from the customer by using the ten keys, the depositing process is carried out. The balancing is completed by handing the change [CH] and a receipt to the customer. At this time, the credit balance [Pi] of the verification number [i] is completely erased, since it was cleared from the credit account area [PA] at the earlier stage at which the verification process was carried out by pressing the verification key [KID].

The key operation procedure of Fig. 6 (d) is for implementing the installment payment processing method of the present invention. As is clearly evident from the drawing, consideration is given so that it is as similar as possible to the key operation procedure explained above. In other words, this key operation procedure (d) consists of a verification procedure [IP] for calling out the credit amount [Pi] of the customer, a procedure for pressing the installment payment key [KD], a registration procedure [RP] as the basic procedure of the cash register, and a depositing procedure [CP], which are the same as those of (b) and (c) of the same figure. What is different from the above procedure is simply that the installment payment key [KD] is pressed one extra time. In this key operation procedure (d), the customer credit amount [Pi] of the verification number [i] is first called out from the credit area [PA] as a sales price to the registration area [RA] in the verification procedure [IP], and then the installment balancing means [3] indicated in Fig. 7 (d) is activated by pressing the installment payment key [KD]. This installment balancing means [3] includes only three steps, as can be seen from the figure. In the first and second steps, [D1] and [D2], the data of the credit amount [Pi] is transferred from the area for the sale amount [S] to the area for the installment amount [D] inside the registration area, and in the third step [D3] 1, which indicates

that installment balancing will be carried out, is assigned to the flag [F].

Next, in the key operation procedure (d), the registration procedure [RP] and the depositing procedure [CP] should be carried out sequentially in exactly the same manner as in a normal sale. When the registration key [KR] is pressed at the end of the registration procedure [RP], the sale registration means [1] is activated. However, since 1 has been assigned to the flag [F], the flow of Fig. 7 (r) becomes different from that of the previous explanation. This time, it skips from the second step [R2] to the fifth step [R5], skipping the Steps [R3] and [R4]. In other words, the sale amount [A] is not added to the category sales total [BjT] or the sales grand total [ST], and the sale amount [A] is just subtracted from the credit amount [Pi] that is in the installment amount [D] inside the registration area [RA]. In the case of installment balancing, this sale amount is part of the credit amount [Pi] that the customer /57. is to pay as an installment, and this is calculated by inputting the quantity and unit price of the items to be paid in installments, which are included in the receipt that was made at the time of the prior deferred payment processing, by using the ten keys [K10] in the same manner as in a regular sale. Of course, the registration procedure [RP] is repeated for each installment balancing object, and therefore, the amount, etc. is

printed onto a receipt each time the registration key [KR] is pressed. This allows the customer to confirm what he/she has paid off in installments and to keep it.

The depositing procedure [CP] after the registration of the items to be paid in installments may be the same as that of a regular sale, but the flow of the installment balancing means [2] activated by this is somewhat different from that of a regular sale as indicated in Fig. 7 (c). In other words, since the flag [F] is 1, the flow shifts from Step [C2] to [C3], and in this step the remaining amount, which is obtained by subtracting the amount being balanced this time from the previous credit amount [Pi] that is in the installment amount [D] inside the registration area [RA], is transferred to the area of verification number 1 in the credit area. Then the step shifts to [C4], and the same remaining amount [D] is added to the credit total of the total area [TA]. Since the sale amount [S], which is the previous credit amount [Pi], was subtracted from this credit grand total [PT] in Step [13] of the previous verification procedure, the previous credit amount of the customer of verification number 1 inside the credit grand total [PT] is consequently replaced by a new credit amount, which is the amount that remained after the installment balancing this time. The later steps, [C5] and [C6], are exactly the same as a regular sale, and the customer [5] can acknowledge the details of the

balance and the amount still due based on the receipt printed in Step [C5]. Moreover, since said flag [F] is cleared to 0 for the first time in the last step, [C6], the register is recovered to the regular state prior to the start of the sale, and the generation of operation errors in which the flag is erased by mistake in the middle of installment balancing can be prevented.

As is clear from the key operation procedure of Fig. 6 and the flow of the process of Fig. 7, the key operation of a cash register in which the method of the present invention is implemented is hardly different from a case of a conventional register, and there is hardly any fear of confusion of key operations occurring. Moreover, the number of steps in each process flow is not very different from that of the past, and only a few steps need to be added overall. Moreover, the processing means and procedures activated individually by means of the function keys are arranged together in a simple module, and no operational mistakes or confusion of the sequences occur.

The method of the present invention can be implemented in various modes without being confined to the above-explained working example. Various modes can be used for flexibility in the key arrangement and combination, the storage area allocation and assignment, and even the arrangement and order of the steps inside each processing means, as long as the main points of the present invention are not deviated from. Moreover, it is clearly

evident that the items displayed in the display device or the items printed by the printer may be sorted out any time in accordance with the usage.

[Effects of the Invention]

As explained above, in the method of the present invention, an installment payment processing function that was not conventionally attempted often is incorporated in an electronic cash register equipped with at the least a sale registration means for calculating the sale amount for each sale by means of a registration key input and for calculating and storing the total of said sales and a depositing means for calculating and storing the total of the deposits by means of a cash key input. At this time, the prescribed purpose can be achieved by a relatively simple means, which is just to arrange the structure in the following manner: An installment balancing means for storing the fact that one portion of the sale is to be balanced as installments by means of an installment payment key input is added; when the installment payment key is input, the sale registration means only calculates the sale amount per sale based on the content stored in the installment balancing means; and the content stored inside the installment balancing means can be erased only by the operation of the depositing means that is based on a deposit key input. In a cash register in which the method of the present invention is implemented, it is needless to

say that the key operations for regular sales and deferred payment sales can be exactly the same as before, but also the key operations are essentially the same as in the past even at the time of installment payment processing and it suffices to insert only a few operation steps. Therefore, the key operations can be simple, making it unlikely for operation errors to occur. Moreover, also in terms of the procedures necessary for the transfer, etc. of the instructions and data inside the computer, the present invention is not originally aimed at increasing the storage or raising the computing accuracy, and simplification is achieved instead since each means and procedure become module-like by using the method of the present invention. Therefore, the number of the processing steps can be reduced, and /575 therefore, the processing speed can be increased. Moreover, as is clear from the above explanation, there is no particular storage area that becomes newly necessary by using the present invention, and as for the keys, it suffices to add only one. Therefore, there are no cost increase factors of the cash register in actuality, and it becomes possible to supply the cash registers at attainable prices.

In the above manner, the method of the present invention can be implemented advantageously in new cash registers that are relatively simple and equipped with an installment payment processing function that was not seen in the past.



#### 4. Brief Explanation of Drawings

All of the figures are for explaining the content of the present invention.

[Figure 1] is a functional schematic diagram showing the principles of the installment payment processing method of an electronic cash register by the present invention.

[Figure 2] is a three dimensional drawing showing the outside view of a cash register in which the method of the present invention is utilized.

[Figure 3] is a block diagram showing an example of the hardware structures of the electronic devices inside a cash register for the implementation of the method of the present invention.

[Figure 4] is an assignment diagram showing an example of the assignment of the storage areas inside the RAM, which is a storage device for the implementation of the method of the present invention.

[Figure 5] is an arrangement drawing showing an example of the key arrangement within the keyboard of a cash register in which the method of the present invention is implemented.

[Figure 6] is an operational procedure chart showing the key operation procedures of a cash register in which the method of the present invention is implemented.

[Figure 7] is a flow chart that shows an example of the flow

from the perspective of the software for the implementation of the method of the present invention.

In the figures,

[1] = sale registration means; [2] = depositing means; [3] = installment balancing means; [10] = microcomputer; [15] = RAM for the storage area; [30] = keyboard; [40] = display/printing means; [50] = electronic cash register; [F] = flag for the data signal for instructing installment balancing; [IP] = verification key operation procedure; [CP] = deposit key operation procedure; [RP] = registration key operation procedure; [KC] = cash key; [KD] = installment payment key; [KID] = verification key; [KP] = deferred payment key; [KR] = category key as a registration key; [K10] = ten keys; [PA] = credit area inside the RAM; and [TA] = total area inside the RAM.

[Figure 1]

1... sale registration means;  
2... depositing means;  
3... installment balancing means.

[Figure 4]

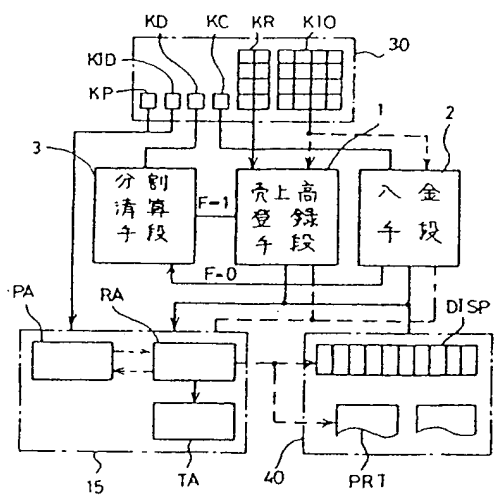
S... sale amount;  
D... installment amount;  
F... installment flag;  
P1... credit amount 1;  
P2... credit amount 2;  
Pn... credit amount n;  
B1T... category 1 sales total;  
BnT... category n sales total;  
ST... sales grand total;  
PT... credit grand total;  
CT... deposit grand total.

[Figure 5]

KID... verification;  
KP... deferred payment;  
KD... installment;  
KC... cash.

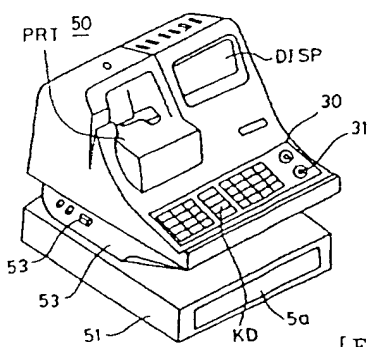
[Figure 7]

R6... A is displayed and printed.;  
C5... S, B, and  $C=B-S$  are displayed and printed.;  
C6... S, D, and F are cleared.;  
I2...  $P_i$  is cleared (PA).;  
I4... S is displayed and printed.;  
P3... S is displayed and printed.;  
P4... S is cleared (RA).;  
D2... S is cleared (RA).



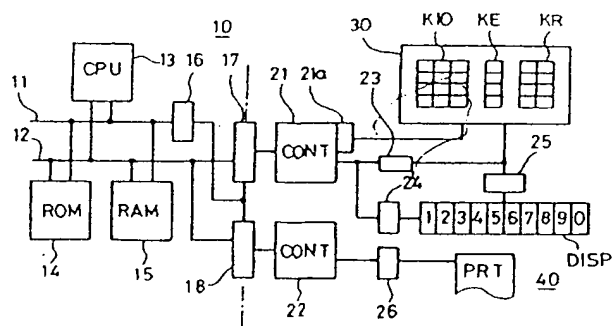
才 1 図

[Figure 1]

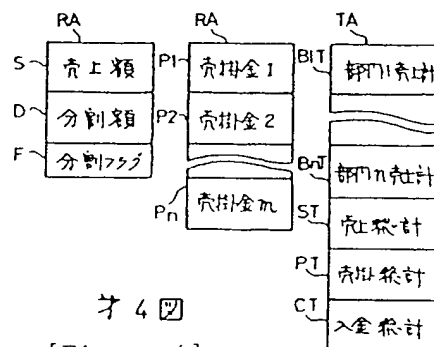


才 2 図

[Figure 2]



[Figure 3] 才 3 図



才 4 図

[Figure 4]

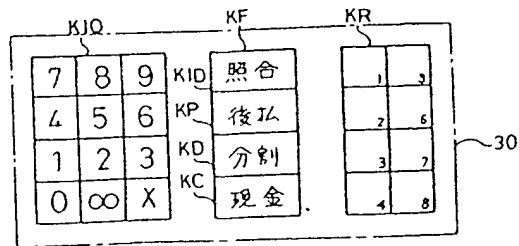


図 5  
[Figure 5]

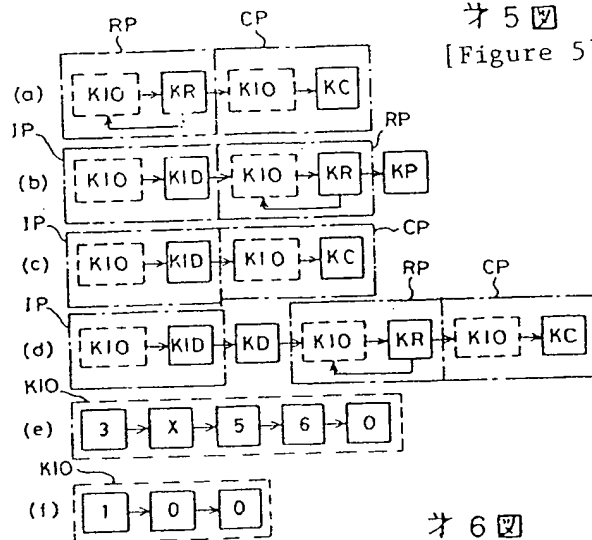


図 6  
[Figure 6]

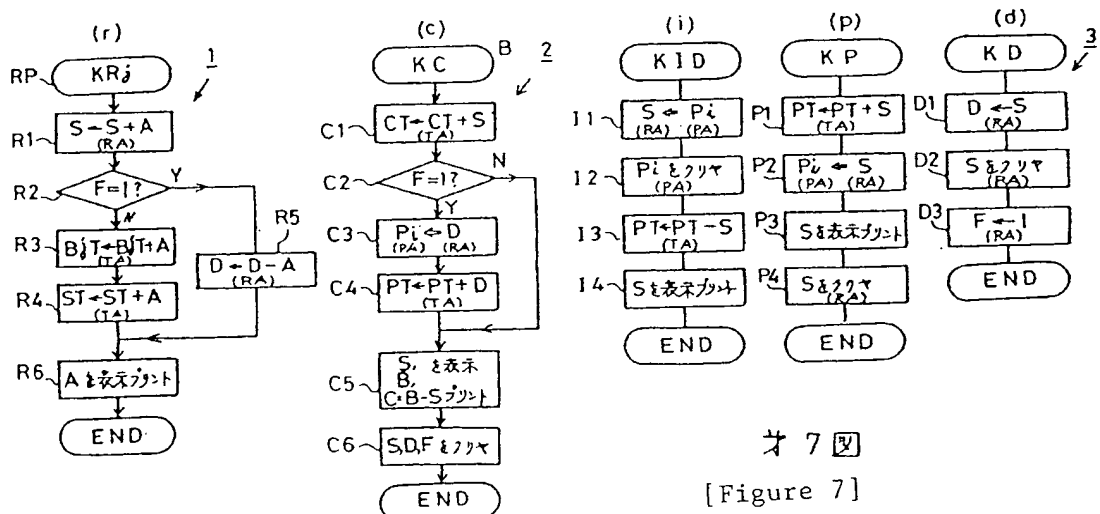


図 7  
[Figure 7]